

## VII. WHAT IS CLAIMED IS:

Claim 1. A modular drive unit for a gurney comprising:

A control/handle module,

A cord charger module,

A drive module,

A chassis assembly,

Electrical wiring harnesses,

Pneumatic tubing, and

Mounting means.

Claim 2. A modular drive unit for a gurney according to claim 1 having a control/handle module to provide means for maintaining directional and speed control over said gurney.

Claim 3. A modular drive unit for a gurney according to claim 2 wherein said control/handle module may be swung 180 degrees down from the operating position in order to facilitate loading or unloading said gurney.

Claim 4. A modular drive unit for a hospital gurney according to claim 2 wherein said control/handle module utilizes a coating on the handle to afford a non-slip grip for the operator.

Claim 5. A modular drive unit for a gurney according to claim 2 wherein at least one control/handle module contains all necessary means for a single operator to control a gurney's speed and direction of travel.

Claim 6. A modular drive unit for a gurney according to claim 1 having a cord charger module to provide means to recharge batteries.

Claim 7. A modular drive unit for a gurney according to claim 6 wherein said cord charger module mainly comprises at least one cord reel.

Claim 8. A modular drive unit for a gurney according to claim 7 wherein said cord charger module contains mounting means to secure it to said gurney.

Claim 9. A modular drive unit for a gurney according to claim 6 wherein said cord charger module contains mounting means for interlock switches selected from hydraulic, electrical mechanical and pneumatic interlock switches which interact with standard linkages common to said gurney.

Claim 10. A modular drive unit for a gurney according to claim 9 wherein said interlock switches control the presence or absence of electrical power and air pressure to said modular unit.

Claim 11. A modular drive unit for a gurney according to claim 1 having a drive module which retractably contacts a floor surface and provides means to propel said gurney in any selected direction and speed.

Claim 12. A modular drive unit for a gurney according to claim 11 wherein said drive module comprises a drive wheel having a self-contained electric motor, gear, and tire unit which will move forward and reverse at variable speeds.

Claim 13. A modular drive unit for a gurney according to claim 11 wherein said drive module comprises a pneumatic air spring which forces said drive wheel in sufficient contact with a floor to avoid slippage.

Claim 14. A modular drive unit for a gurney according to claim 11 wherein said drive module comprises an air compressor and pressure switch to maintain the inflation level of said air spring, irrespective of the relative distance between the floor surface and the gurney chassis, causing said drive wheel to exert the same force on the floor. -11-

Claim 15. A modular drive unit for a gurney according to claim 11 wherein said drive module comprises a lock plate arrangement to adjustably capture the axles of said drive wheel in order to maintain its position relative to the rest of the drive module, and to prevent rotation of said axles.

Claim 16. A modular drive unit for a gurney according to claim 1 having a chassis assembly containing a battery box, a control circuit board assembly, and means to mount said drive module.

Claim 17. A modular drive unit for a gurney according to claim 16 wherein said chassis assembly is designed to mount to the frame of an existing gurney without modifying said gurney.

Claim 18. A modular drive unit for a gurney according to claim 16 wherein said battery box provides space for at least one rechargeable battery and contains a cover to reduce the possibility of water or other contaminants entering said battery box.

Claim 19. A modular drive unit for a gurney according to claim 16 wherein said control circuit board assembly provides an interface between said control/handle module and said drive module.

Claim 20. A modular drive unit for a gurney according to claim 1 containing electrical wiring harnesses which provide all necessary electrical power and feature quick-disconnect fasteners for ease of installation, maintenance, and battery replacement.

Claim 21. A modular drive unit for a gurney according to claim 1 containing pneumatic tubing which provide all necessary air pressure and feature quick-disconnect fasteners for ease of installation and maintenance.

Claim 22. A modular drive unit for a gurney according to claim 1 containing mounting means to attach modules to each other and to the host gurney, said mounting means including but not be limited to: screws, bolts, nuts, washers, lock washers, and nylon tie wraps.

Claim 23. A gurney control system comprising a handle, a mounting system, and a control system.

Claim 24. A gurney control system according to claim 23 wherein said handle may be made from a material selected from steel, aluminum, and carbon fiber and is partially covered with a material to provide a slip-resistant gripping surface.

Claim 25. A gurney control system according to claim 23 wherein said handle provides means of controlling the speed and direction of movement of said gurney as well as providing a mounting means for the control assembly.

Claim 26. A gurney control system according to claim 23 wherein said mounting system comprises means to secure said handle to the gurney, means to lock said handle in the upright position, and means to allow said handle to swing down through 180 degrees to facilitate loading and unloading the gurney.

Claim 27. A gurney control system according to claim 26 wherein said securing means may be made of a material selected from steel, aluminum, carbon fiber and is mounted to said gurney using existing holes in the gurney; said securing means comprising mechanical fasteners including an appropriate combination of screws, nuts, bolts, and washers.

Claim 28. A gurney control system according to claim 26 wherein said means to lock said handle in the upright position comprises a socket into which the handle is held by gravity. -13-

Claim 29. A gurney control system according to claim 26 wherein said swinging means comprise pivot pins mounted to said handles which ride in slots in the sides of the mounting means.

Claim 30. A gurney control system according to claim 23 wherein said control assembly comprises a housing containing controlling means.

Claim 31. A gurney control system according to claim 30 wherein said housing is made from a material selected from steel, aluminum, plastic, and carbon fiber.

Claim 32. A gurney control system according to claim 31 wherein said housing is mounted to said handle and comprises an upper housing and a lower housing; said upper housing comprises an on/off switch, a directional switch, and a battery charge indicator; said lower housing contains speed control throttles and throttle guards.

Claim 33. A gurney control system according to claim 32 wherein said on/off switch provides means to energize or de-energize all electrical components of the gurney electrical system.

Claim 34. A gurney control system according to claim 32 wherein said on/off switch is selected from a rocker, rotary, and a toggle switch.

Claim 35. A gurney control system according to claim 31 wherein said directional switch provides means to select the direction in which the gurney moves.

Claim 36. A gurney control system according to claim 31 wherein said directional switch is selected from may be a rocker, rotary, or toggle switch type.

Claim 37. A gurney control system according to claim 31 wherein said battery charge indicator contains means for indicating the state of the battery charge.

Claim 38. A gurney control system according to claim 37 wherein said means for indicating the state of the battery charge is selected from a light emitting diode (LED), a liquid crystal display (LCD), and at least one incandescent lamp that indicates the state of the battery charge.

Claim 39. A gurney control system according to claim 31 wherein said speed control throttles provide variable voltage and current to the drive unit, allowing the gurney to travel at variable speed.

Claim 40. A gurney control system according to claim 31 wherein said speed control throttles may be moved to multiple positions to provide variable voltage and current to the drive unit, allowing the gurney to travel at variable speed.

Claim 41. A gurney control system according to claim 39 wherein one speed control throttle is mounted on each side of said lower housing assembly, allowing the user to operate either handle to vary the speed of the gurney.

Claim 42. A gurney control system according to claim 31 wherein one throttle guard is mounted on each side of the lower housing, and is positioned so as to reduce the possibility of accidental actuation of said speed control throttles.

Claim 43. A gurney control system according to claim 42 wherein said throttle guards are made from a material selected from steel, aluminum, and plastic.

Claim 44. A cord reel/charger assembly comprising:  
a cord reel;  
means for mounting said cord on a gurney;  
and a charger assembly.

Claim 45. A cord reel/charger assembly according to claim 44 wherein said assembly includes a cord reel electrical cords, and a housing.

Claim 46. A cord reel/charger assembly according to claim 45 wherein said electrical cords comprise an input cord and output cord.

Claim 47. A cord reel/charger assembly according to claim 46 wherein said input cord is terminated by a common grounded male electrical plug.

Claim 48. A cord reel/charger assembly according to claim 46 wherein said input cord is wound around said enclosed, spring-loaded reel, whereby when in use, said input cord may be pulled from said spring-loaded reel until sufficient length is obtained to reach a nearby wall socket, and after use, said input cord is allowed to retract into the housing by means of the spring-loaded reel.

Claim 49. A cord reel/charger assembly according to claim 44 wherein said output cord is not retractable, but is instead fixed on the side of said enclosure, and is of sufficient length to reach the charger assembly.

Claim 50. A cord reel/charger assembly according to claim 44 wherein said housing provides a safe enclosure for said electrical cords and spring-loaded reel.

Claim 51. A cord reel/charger assembly according to claim 50 wherein said spring-loaded reel contains a length of electrical cord sufficient to reach a nearby wall mounted socket, and provides for easy extension and retracting of said electrical cord.

Claim 52. A cord reel/charger assembly according to claim 44 wherein said mounting means are secured to said cord reel, and in turn are secured to existing holes in the gurney using common mechanical fasteners. -16-

Claim 53. A cord reel/charger assembly according to claim 44 wherein said charger assembly is a commercially available unit comprising a housing, charging circuitry, and wherein said housing protects said charging circuitry from water or other foreign damage, and prevents outside contact with said charging circuitry in order to prevent personal injury.

Claim 54. A cord reel/charger assembly according to claim 53 wherein said charging circuitry receives electrical power via said cord reel, and converts it to an appropriate voltage to charge batteries.

Claim 55. A cord reel/charger assembly according to claim 52 wherein said mounting means secure said charger assembly to the gurney.

Claim 56. A drive module system comprising;

a housing;

a drive wheel assembly;

an air spring;

an air compressor;

a pressure switch;

means for pivoting;

means for mounting, and

an interlock system.

Claim 57. A drive module system according to claim 56 wherein said housing includes a cover to protect its components from water or other foreign matter contamination.

Claim 58. A drive module system according to claim 56 wherein said drive wheel assembly is a self-contained unit having axles, a tire, an internal electric motor, internal gearing, and means for braking. -17-



Claim 59. A drive module system according to claim 57 wherein said housing and said cover are made from a material selected from steel, aluminum, and carbon fiber.

Claim 59. A drive module system according to claim 56 wherein said drive wheel assembly is a self-contained unit having axles, a rubber tire, an internal electric motor, and internal gearing.

Claim 60. A drive module system according to claim 59 wherein said axles are round with flat sides and provide means to secure said drive wheel assembly.

Claim 61. A drive module system according to claim 59 wherein said tire provides sufficient traction to move the gurney.

Claim 62. A drive module system according to claim 59 wherein said internal electric motor is energized by variable voltage, and may run in forward or reverse, depending upon the polarity of the applied voltage.

Claim 63. A drive module system according to claim 59 wherein said internal gearing transfers rotational motion from the motor to said tire.

Claim 64. A drive module system according to claim 56 wherein said air spring will increase its size when air pressure is applied, and decrease when said air pressure is removed.

Claim 65. A drive module system according to claim 56 wherein said air compressor provides sufficient air pressure to inflate said air spring when electrical power is supplied to said air compressor.

Claim 66. A drive module system according to claim 56 wherein said pressure switch includes at least one preset air pressure setpoint, and is an adjustable unit capable of controlling the electrical power supplied to said air compressor and turning it on or off based on said preset air pressure setpoint.

Claim 67. A drive module system according to claim 66 wherein said pressure switch senses the air pressure in the air spring, and maintains it said preset air pressure setpoint, whereby substantial contact is maintaining contact between said the drive wheel and the floor surface.

Claim 68. A drive module system according to claim 56 wherein said means for pivoting comprise pivot arms, a pivot axle, means for mounting said drive wheel, and a resilient spring means.

Claim 69. A drive module system according to claim 68 wherein said pivot arms are made from a material selected from steel, aluminum, and carbon fiber.

Claim 70. A drive module system according to claim 69 wherein said pivot arms swing up and down based on the air pressure present in said air spring, allowing said drive wheel to either raise up from or contact the floor to provide drive power.

Claim 71. A drive module system according to claim 68 wherein said pivot axle connects said pivot arms to said housing, and provides means for said pivot arms to freely swing up and down.

Claim 72. A drive module system according to claim 68 wherein said means for mounting drive wheel comprise lock plates and slots cut into said pivot arms and said lock plates.

Claim 73. A drive module system according to claim 72 wherein said slots in said lock plates and said pivot arms have straight sides that capture the flats of said axles, thereby preventing said axles from turning.

Claim 74. A drive module system according to claim 68 wherein said resilient spring means provides means to maintain said drive wheel and said pivoting means in the retracted position when air pressure is removed from said air spring.

Claim 75. A drive module system according to claim 56 wherein said mounting means comprise surfaces containing holes which correspond to holes in the chassis assembly, and mechanical fasteners.

Claim 76. A drive module system according to claim 56 wherein said interlock system interlock switches selected from hydraulic, electrical mechanical and pneumatic interlock switches which interact with standard linkages common to said gurney.

Claim 77. A drive module system according to claim 76 wherein said air pressure release valve controls the presence or absence of air pressure in the drive system.

Claim 78. A drive module system according to claim 76 wherein said electrical interlock switch controls the presence or absence of electrical power in the drive system depending upon the position of the gurney's brake pedal.

Claim 79. A drive module system according to claim 78 wherein said pneumatic and electrical circuitry provide routing for air pressure and electrical power, respectively.

Claim 80. A drive module system according to claim 79 wherein said actuating means is mounted on the gurney's brake pedal linkage for purposes of triggering said air pressure release valve and said electrical interlock switch when the gurney's brake pedal is depressed.

Claim 81. A drive unit chassis assembly comprising:  
a structural frame;  
a battery box;  
and a motor controller assembly.

Claim 82. A drive unit chassis assembly according to claim 81 wherein said structural frame is made from a material selected from steel, aluminum, and carbon fiber.

Claim 83. A drive unit chassis assembly according to claim 81 wherein said structural frame is designed to fit on the chassis of existing gurneys, and be secured by mounting means including mechanical fasteners.

Claim 84. A drive unit chassis assembly according to claim 83 wherein said mounting means comprise a series of holes so located as to correspond to holes present in said existing gurney chassis.

Claim 85. A drive unit chassis assembly according to claim 81 wherein said battery box is made from a material selected from steel, aluminum, and carbon fiber, or other suitable material, and includes a cover of like material to protect the contents from damage by water or other foreign matter intrusion.

Claim 86. A drive unit chassis assembly according to claim 85 wherein said battery box is attached to said structural frame by means of welding, bonding, and/or mechanical fasteners.

Claim 87. A drive unit chassis assembly according to claim 81 wherein said motor controller assembly comprises a housing, electrical circuitry, and mounting means.

Claim 88. A drive unit chassis assembly according to claim 87 wherein said housing is made from a non conductive material selected from plastic, and carbon fiber.

Claim 89. A drive unit chassis assembly according to claim 88 wherein said housing protects said electrical circuitry from damage by water or other foreign matter intrusion, and protecting any persons who may otherwise come into contact with electrical circuitry.

Claim 90. A drive unit chassis assembly according to claim 87 wherein said electrical circuitry includes speed control throttles, and provides a variable voltage to said drive wheel, based on the position of said speed control throttles, resulting in gurney travel at variable speeds.

Claim 91. A drive unit chassis assembly according to claim 90 wherein said mounting means secure said motor controller assembly to said structural frame by means of mechanical fasteners.

Claim 92. A system for traversing irregular pathways comprising:  
a drive wheel assembly;  
a resilient air spring;  
an air compressor;  
a pressure switch; and  
pivoting means of the drive module system.

Claim 93. A system for traversing irregular pathways according to claim 92 wherein said air spring contains a constant air pressure provided by said air compressor and regulated by said pressure switch.

Claim 94. A system for traversing irregular pathways according to claim 93 wherein said pressure switch recognizes a drop in air pressure inside said air spring when the drive wheel assembly begins to lose contact with the floor due to irregularities in the floor.

Claim 95. A system for traversing irregular pathways according to claim 94 wherein said pressure switch provides electrical power to said air compressor, which restores the preset air pressure to said air spring, causing it to expand farther, lowering said pivoting means down and forcing said drive wheel back into contact with the floor.

Claim 96. A system for traversing irregular pathways according to claim 95 wherein said pressure switch recognizes an increase in air pressure, and releases the excess, maintaining the preset pressure inside said air spring, and keeping said drive wheel from exerting too much force on the floor.